BBA Lab a Virtual Laboratory for Distant Learning

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***Abstract*—Nowadays distant learning is gaining more and more popularity due to the technological development and the flexibility it offers for the students. All around the world we see universities conceiving their distant learning platforms in order to offer to their students this service and help them study at their own pace. In this paper we describe BBA lab a draft of the distant lab of Bordj Bou Arreridj University. It is dedicated mainly to students in the field of electrical engineering and computer science. Bordj Bou Arreridj University is involved in a project which is financed by the Eurepean Community and aims to link three distant Elabs, the Algerian Elab, developed by Constantine 1 and Bordj Bou Arreridj Universities, the Moroccan and the Tunisian Elabs.**

***Index Terms*—Distant Elabs, internet, work packages, simulation.**

I. Introduction

Great developments in education have been achieved in the last two decades; this is due to the large use of internet and personal computers. This new way of life imposes for educational institutions to innovate and use these tools to offer to their students' facilities to enroll to specific courses and study remotely [1].

BBA Elab as stated earlier is a part of a TEMPUS project financed by the European Community. ESience is its acronym it stands for "r**ES**eau maghr ébI**I**n de laboratoir**E**s à dista**NCE**". The project is coordinated by Bordeaux 1 University from France with the participation of many other European partners. These Elabs will offer, online, practical and theoretical teachings which will be used by their students as part of their degree programs. The project is divided in several work packages and in each one several tasks have to be accomplished. The first work package involves the definition and the conception of the teaching units. We have to develop two out of fifteen initially programmed for this project. The first one is the "Study and Utilization of Simulators Associated to Remote Characterization of Circuits and Systems" [2], the second one is "Biometric Identification" [3].

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II. BBA Lab Architecture

A. The Architecture

The architecture of the Elab is composed by two different servers dedicated to different tasks:

- The BBA Lab Server is the visible part of the Elab for the users via internet.
- The Simulation Server gives the students the possibility to do their simulation on electronic components.

This severs were installed on Linux platform and use LAMP structure (Linux-Apache-MySql-PHP).

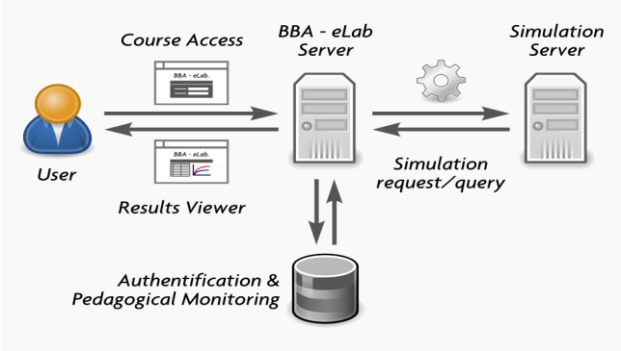

Fig. 1. BBA Elab architecture.

B. Multimedia Lab

The first task was the Installation of a networked lab then the configuration of 20 personal computers which will be used by our students when they are on campus. The following is a photo of the lab (see Fig. 2):

Fig. 2. BBA multimedia lab.

C. The BBA Lab Server

We Used the Moodle (Modular Object-Oriented Dynamic Learning Environment) [4], [5] platform which is from our point of view best suited for academic institutions. The following is the first login page for users (see Fig. 3).

The user either has an account, so he can access directly or he can contact us in order to enroll and give him an account to access the platform. After his authentification he will see the

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following and begin using the platform (see Fig. 4):

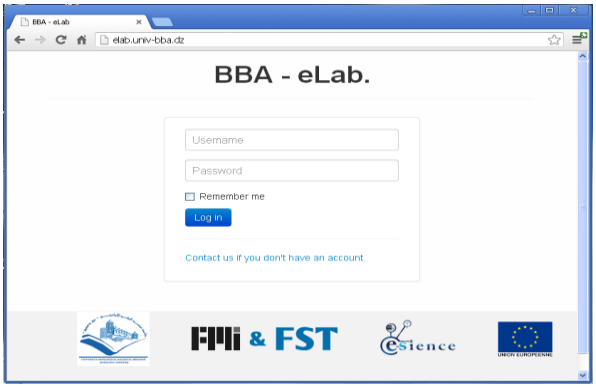

Fig. 3. Login page.

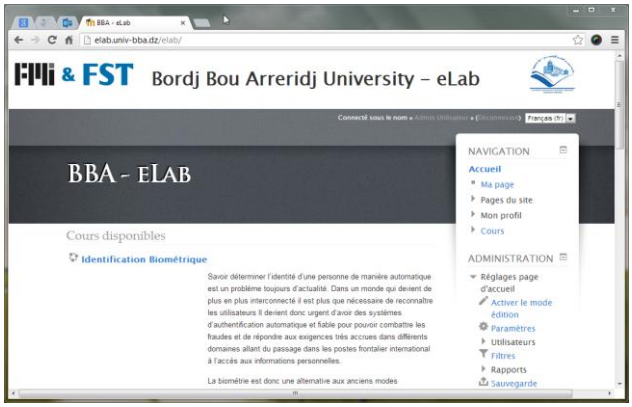

Fig. 4. Proposed courses.

D. The Simulation Server

This server is configured under Linux Red Hat Server Distribution. We acquired a license for AMS (Analog and Mixed Signals) [6] from SILVACO, which includes SMARTSPICE, an electrical circuit simulator, for device modeling, characterization and optimization of model parameters. The following page will be used by students to access the server guided by an interface which will introduce his data to the server who will process them and then give him the simulation results (see Fig. 5).

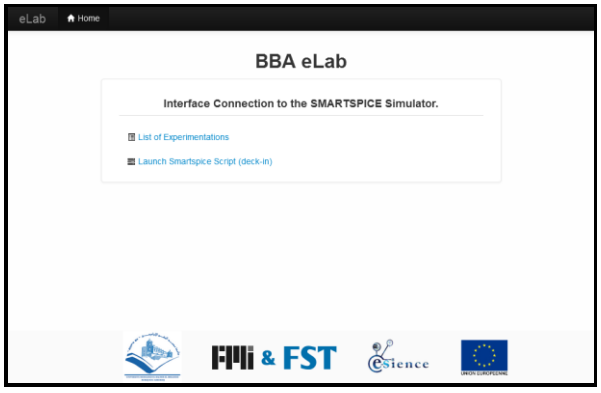

Fig. 5. Interface giving access to the simulation server.

The process of execution of the simulation is illustrated by the following diagram (see Fig. 6):

The following is an example of the use of the server in order to get the characteristics of electronic circuits.

A set of measurements have been performed via Internet at the eLab remote characterisation platform of Bordeaux University to get electrical characteristics IDS (VDS). VDS sweeping from 0 to 3 V, VGS=2.0 and 3.0 V, VBS=0.0 V SMARTSPICE deck-in will be introduced using the interface described in Fig. 5. The following interface is used to introduce the data (see Fig. 7):

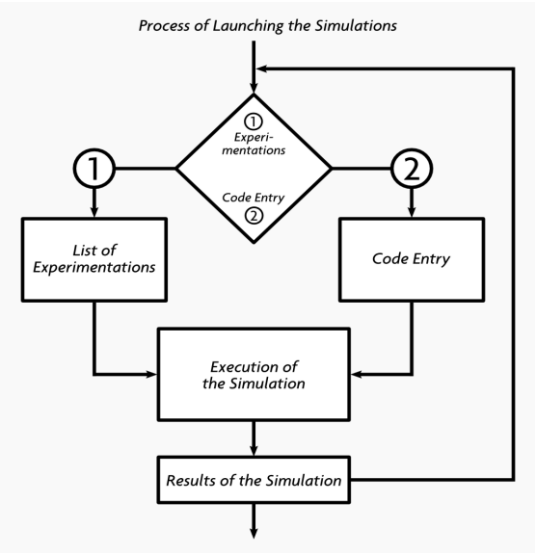

Fig. 6. Diagram of the process launching the simulations.

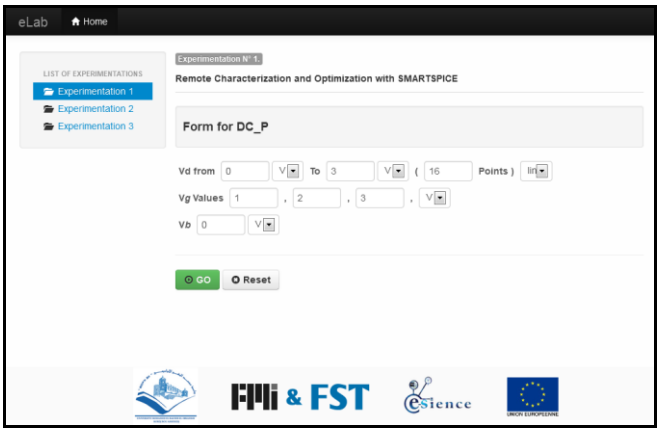

Fig. 7. Interface of the introduction of the data.

The simulation results give the comparison of simulated and experimental characteristics after optimization (see Fig. 8). The curves are superposed (these curves were plot by Pylab, a tool from matplotlib [7]).

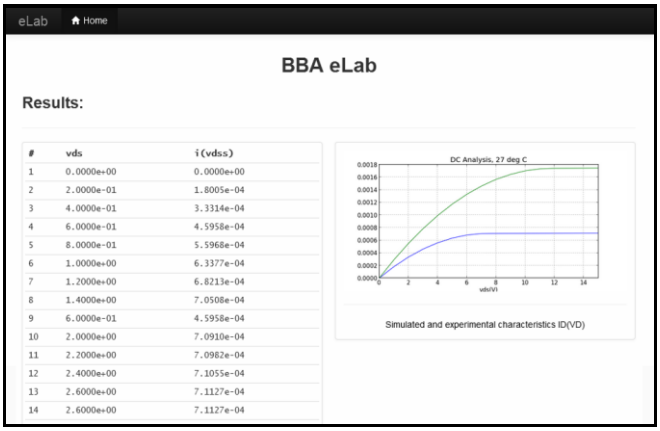

Fig. 8. Simulated and experimental characteristics ID(VD).

In the same time SMARTSPICE gives optimization results about parameters in an output file which can be visualized easily.

III. Conclusion

We presented in this paper the general architecture of BBA Lab which is a virtual laboratory and will be used by our students. The lab is under development and will be enriched by many other teaching units and theoretical notions. Its content will have a great impact on the process of studying of our students and will be certainly of great help to them since they can study at their own pace and from everywhere. The lab will be linked to the other labs, Constantine 1, Morocco and Tunisia labs, as soon as they will be accessible and the students from the three countries will have access to all their contents.

Acknowledgment

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References

[1] T. Zimmer, M. Billaud, and D. Geoffroy, "A remote laboratory for electrical engineering education," *IMCL2006*, April 19-21, 2006 Amman, Jordan.

[2] J. J. Charlot, L. Selmani, S. Akrouf, D. Boubetra, and A. Boubetra, "Study and Utilization of simulators Associated to Remote characterization of Circuits and Systems," in *Proc. International Conference on Engineering and Research 2013*, 1 July-5 July 2013, Marrakesh.

[3] S. Akrouf, L. Selmani, D. Boubetra, and M. Mostefai, "A Biometric Identification Course for Esience Virtual Lab," presented at 2013 4th International Conference on Software and Computing Technology (ICSCT 2013), October 24-25, 2013, Konya Turkey.
Faculty opinions of Moodle: spring survey 05. Earlham College. [Online]. Available: http://www.earlham.edu/%7Emarkp/cms/evaluations/faculty_05/spring_survey.php.

[4] Moodle Services. (2004). Welcome to the Moodle Service Network! [Online]. Available: http://moodle.com/

[5] Smart Spice user's guide. [Online]. Available: www.silvaco.com

[6] Matplotlib. [Online]. Available: http://matplotlib.org/

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